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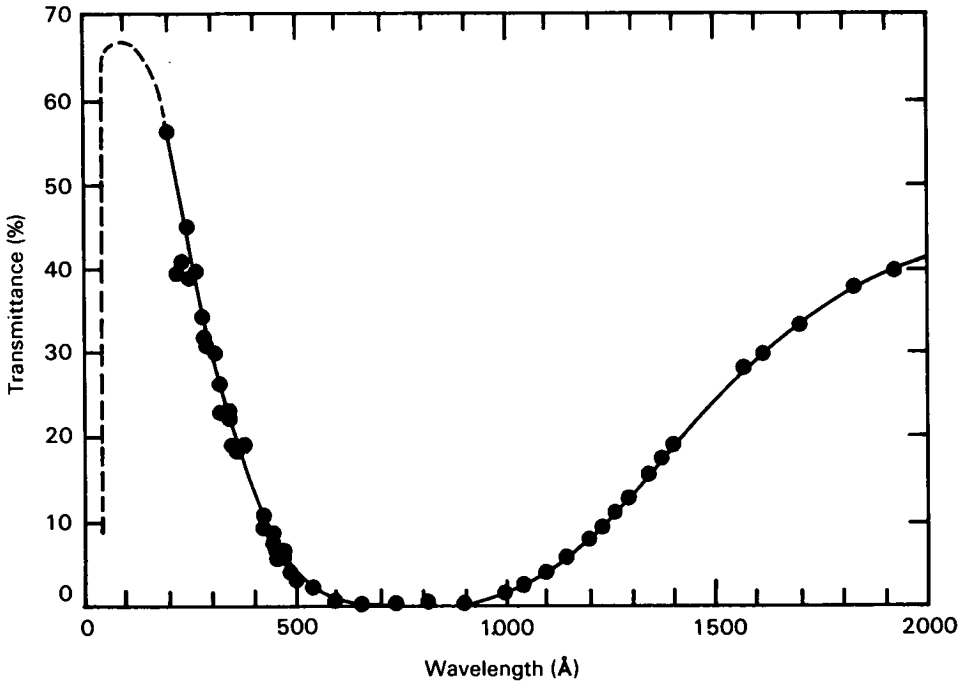
NASA TECH BRIEF

Thin Carbon Film Serves As UV Bandpass Filter



TRANSMITTANCE OF CARBON 270 Å THICK

The problem:

To provide a thin-film filter for narrow-band detectors in the extreme ultraviolet at wavelengths shorter than the lithium fluoride cutoff. The filter must also be capable of suppressing scattered light and light of unwanted orders in vacuum spectrographs.

The solution:

A thin carbon film deposited on a 70% transparent screen.

How it's done:

A thin (270 Å) carbon film is evaporated onto a clean microscope slide, floated off in water, and picked up on a 70% transparent screen. This film has a transmittance of 47% for the visible light emitted from a tungsten lamp.

No discrete structure is observed in the vicinity of 1800 Å where characteristic electron-energy losses have been reported. The transmittance decreases

(continued overleaf)

continuously from 41% at 2000 Å to 1% at 1000 Å. Between 900 Å and 600 Å the film is very highly absorbent. In the vicinity of the free-electron plasma frequency (526 Å) the transmittance again begins to increase, reaching 56% at 209 Å. It is presumed that the transmittance will reach a maximum at shorter wavelengths and fall to zero at 43.6 Å, the carbon K absorption edge.

Notes:

1. Transmittance at 304 Å is 30% while at 384 Å it is 1%, a discrimination of 30:1. Doubling the film thickness provides a discrimination of 900:1, with a 9% transmittance at 304 Å.
2. Increased discrimination between the 304 Å and 584 Å lines may be achieved by use of a commercially available plastic phosphor, which contains scintillation chemicals in polyvinyltoluene.
3. If a thin film of aluminum, 800 Å to 1000 Å thick, is evaporated onto the carbon-scintillator combination, the resultant filter will pass radiation only between 172 Å and 550 Å.
4. Further information concerning this innovation is given in "A Carbon Film-Scintillator Combination Suitable for the Selective Detection of Radiation in the Extreme Ultraviolet," by J. A. R. Samson and R. B. Cairns, Applied Optics, Vol. 4, No. 8, August 1965.
5. Inquiries may also be directed to:
   Technology Utilization Officer
   Electronics Research Center
   575 Technology Square
   Cambridge, Massachusetts, 92139
   Reference: B66-10060

Patent status:

No patent action is contemplated by NASA.

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